Nanosystems Engineering Research Center for
Nanotechnology-Enabled
Water Treatment

CEVE 565:
NanoEnvironmental Engineering for Teachers (NEET)

Rice University Office of STEM Engagement

Syllabus

January 2020 – April 2020

Instructors

Associate Director for Science & Engineering
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ENGR Academic & Student Affrs Lecturer
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Required Text (provided)

Madden, Andrew. Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9-12. N.p.: National Science Teachers Association, 2011. Print.

Summary of Program

The NanoEnvironmental Engineering for Teachers (NEET) course is designed to serve AP environmental science teachers. The purpose of the program is to increase the content knowledge of educators and to empower them in implementing rigorous project-based engineering activities on the topic of water sustainability. We will accomplish this goal through the mastery of environmental science content and the exploration of the most effectively proven "best practices" in educational pedagogy. *Every teacher participant is expected to engage in active discussions and analysis. This requires that every teacher participant complete and critically analyze readings and content activities, as well as evaluate their own classroom practices.*

Program Objectives

1. To think reflectively and critically about current teacher practice.
2. To improve secondary teachers' understanding of advance placement and state standards.
3. To facilitate the transformation of teacher practice through the exploration of best practices in educational pedagogy.
4. To disseminate NEWT research conducted at Rice University, Yale, The University of Texas-El Paso, and Arizona State University.
5. To support NEET participants in the application of problem-based learning and engineering practices.

Program Expectations

Participants are expected to complete all components of NEET:

1. Attendance and participation
2. Pre- and post-tests/surveys
3. Program assignments
4. Forum Discussions/Participation
5. End-of-program presentation

Stipends will be awarded to reflect the completion of all of these components. Failure to complete any component of the program in full or in part will result in a prorated stipend.

Stipend Disbursements

Final stipends are not requested until after post-surveys have been received. Once we request stipends, it can take 2-6 weeks for checks to be processed, approved, cut, and mailed to you. Stipends are sent to the address you provided when you uploaded your W-9. If you move before we receive post-surveys, or you need to change your mailing address, you need to notify us and upload a new W-9 online. Notifications for address changes and any other inquiries regarding stipends must be sent to stem@rice.edu.

Safety Regulations

You must wear the following Personal Protective Equipment (PPE) at all times while in the lab (**no exceptions**)

- Long-sleeved, knee-length lab coat
- Safety glasses/goggles
- Clothing that fully covers yourself to the ankle (pants are best)
- Closed-toe shoes with backs (full coverage shoes are best, high heels are discouraged)

Based on the experiment or procedure, additional PPE such as gloves may be required. Laboratory gloves should only be worn inside the laboratory. Furthermore, the instructor or lab assistant must always be physically present for you to work in the lab. ***You will not be allowed to work in the lab if you fail to meet these safety regulations.***

Attendance

You are expected to attend all course sessions. ***Please sign in and out on the attendance sheet at each class session.*** If class schedule conflicts arise, please contact Christina Crawford as soon as you can.

Surveys

Participants are required to complete several pre-tests and post-tests during the course as well as institute evaluation surveys.

- Pre- Teaching Engineering Self-Efficacy Survey
- Post- Teaching Engineering Self-Efficacy Survey
- End of Course Feedback Survey
- Fall Classroom Implementation Survey (next semester after course as ended)

Assignments

Assignments are designed for participants to reflect and apply the knowledge gained in their classroom. Completing readings, notes or annotations are a must, so that you will have material to facilitate discussion every week. Any participant with special needs or concerns is requested to speak with one of the instructors as soon as possible. All discussions will remain confidential.

Project-based Development

Over the course of the program, participants will engage in discussions with the purpose of designing a new product/idea utilizing the engineering design model. Choosing an environmental science related case-study; participants will work in teams to design or update a solution that will address their chosen issue. The NEET staff and contractors will work with participants to assist them in developing their idea and re-designing. Both in and out of class time will be necessary for completing the projects.

Disability Statement

Any student with a documented disability needing academic adjustments or accommodations should speak with me during the first day of class after class or during office hours. All discussions will remain confidential. I will try to make whatever accommodations are necessary. You will also need to contact Disability Support Services in the Ley Student Center to register. (http://students.rice.edu/students/Disability.asp).

Honor Code

Established in 1912, the Honor Code is one of the most distinct aspects of the academic experience at Rice. Everyone who enrolls at Rice agrees to abide by the code, which covers such matters as plagiarism and giving or receiving aid on exams. Work completed under the Honor Code carries the pledge cited below followed by the student's signature. The Honor Code fosters a spirit of freedom, independence, honesty and mutual trust that exemplifies the academic enterprise at its best. In most courses, students are able to schedule final exams when they want them, rather than having two exams on the same day or three or four in a row. In many cases, exams may be taken in the library or in the students' rooms. Exams for large classes are scheduled for specific times, but even those are not proctored. The student-elected Honor Council oversees the Honor Code and considers reported violations.

"On my honor, I have neither given nor received any unauthorized aid on this (exam, quiz, paper)."

Spring Session Dates

Thursday Sessions: 6:00 pm – 9:00 pm CST; Rice University Campus,
Thursday Sessions: 5:00 pm – 8:00 pm MST; ASU-Tempe Campus,

NanoEnvironmental Engineering for Teacher Session Dates				
DATE	**TOPICS *(tentative)***	**OBJECTIVE *(tentative)***	**Homework**	**HOURS**
1/9/2020	Welcome to NEET	• Safety Training • What's the Problem • Why PBL, Engineering design, & NEWT to address the problem	• Read Chapters 1-3 of text • Independent Review of Case Studies	**3**
1/16/2020	Interdisciplinary Environmental Explorations	• Introduction to Nanotechnology and Water Pollution	• Read Chapters 4-5 of text • Independent Review of Case Studies	**3**
1/23/2020	Engineering Design	• Process of Engineering Design • Components of Engineering • Case Studies & Group Formations	• Research current methods for addressing your case study	**3**

NanoEnvironmental Engineering for Teacher Session Dates				
DATE	**TOPICS *(tentative)***	**OBJECTIVE *(tentative)***	**Homework**	**HOURS**
1/30/2020	RET Lesson Presentation 1	• NEWT RET participant share the experience during the 6-week internship in a NEWT Lab and the lesson developed • Semester Project Case Study – Defining the Problem & Research	• Independent Research & Brainstorming	**3**
2/6/2020	Engineering Design	• Case Study – Team Brainstorming • Idea/design development – NEWT Student Mentors	• NEWT Article Review • Peer Feedback	**3**
2/13/2020	NEWT Research Discussion	• NEWT Faculty Talk • NEWT Lab Tour lead by – NEWT Student Mentors	• Independent concept development	**3**
2/20/2020	Interdisciplinary Environmental Explorations	• Investigation of Bacterial Transport in Groundwater • Nanoforces in Nature	• NEWT Article Review	**3**
2/27/2020	NEWT Research Discussion	• NEWT Faculty Talk • Photocatalysts	• Material List	**3**
03/05/2020	RET Lesson Presentation 2	• NEWT RET participant share the experience during the 6-week internship in a NEWT Lab and the lesson developed • Idea/design development – – NEWT Student Mentors	-	**-**
03/12/2020	NEWT Research Discussion	• NEWT Faculty Talk • Group work	• NEWT Article Review • Peer Feedback	**3**
3/19/2020	No Class	• Spring Break	-	**3**
3/26/2020	Engineering Design	• Participants will use class time to work on their water sustainability projects within their teams – NEWT Student Mentors	-	**3**
4/02/2020	Engineering Design	• Participants will use class time to work on their water sustainability projects within their teams – NEWT Student Mentors	-	**3**
4/09/2020	RET Lesson Presentation 3	• NEWT RET participant share the experience during the 6-week internship in a NEWT Lab and the lesson developed • Testing Design/Updating	-	**3**

NanoEnvironmental Engineering for Teacher Session Dates				
DATE	**TOPICS *(tentative)***	**OBJECTIVE *(tentative)***	**Homework**	**HOURS**
4/16/2020	Engineering Design	• Participants will use class time to work on their water sustainability projects within their teams • Poster Development	• Engineering Posters • Peer Feedback	**3**
4/23/2020	Project Showcase	• Group Project Presentations • Post Testing		**3**
		TOTAL		**45**